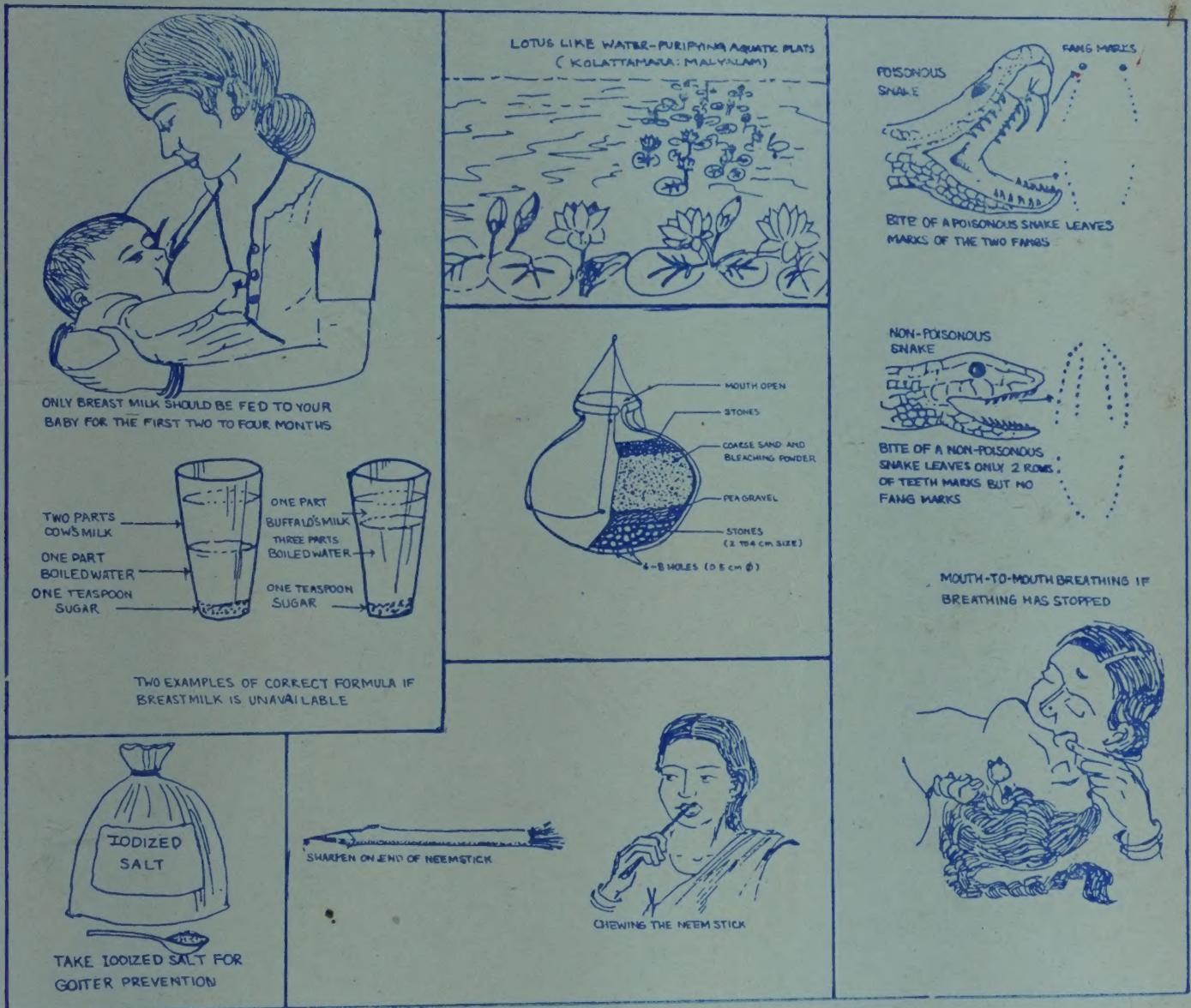


# SCIENCE AND TECHNOLOGY

Drinking Water and Sanitation

Nutrition and Health Improvement

Hazards and Accidents Protection



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DRINKING WATER & SANITARY TECHNOLOGIES  
Drinking Water Sanitary Facilities

Only 30% of the rural population has access to water and virtually nobody has a latrine. It is estimated that of every three people in the world without clean water or sanitation, one is an Indian. Half of the illhealth in our villages is caused by water-borne diseases. The women are the worst affected. Simple methods for making water safe for drinking which can be taken to all rural communities or homes, are needed.



# CHARCOAL WATER FILTER

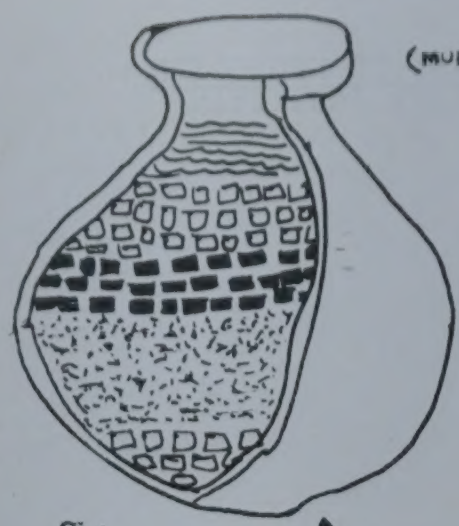
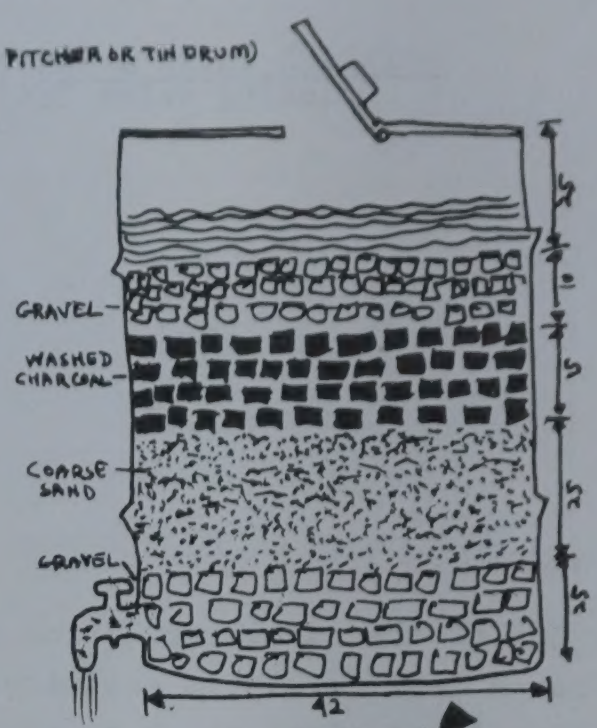


Fig 1



(ALL DIMENSIONS IN CM.)  
Fig 2



Fig 3





## CHARCOAL WATER FILTER

Description: Charcoal water filter is one of the simpler solutions to the wide spread problems of polluted water in the villages. It is successful in the removal of suspended material and harmful bacteria in polluted water to a level satisfactory for human consumption. The turbidity of water decreases by 19% after a week and by 97.3% upon maturation after two months.

### Materials:

- (i) Gravel for filtration
- (ii) Sand
- (iii) Charcoal - for removing colour, odour, taste and certain dissolved impurities.

Process: A galvanised iron drum (or a clay pitcher), as shown in the Figs. 52.1 & 52.2, 42 cms in diameter and 100 cm. in height, with a tap is taken. The materials are washed before being filled. The first layer is of gravel filled upto a height of 25 cms. This is to remove dust and dirt. A layer of coarse sand is placed on the gravel upto a height of about 25 cms. It is covered with a bed of charcoal and is again covered with a thin layer of gravel to a height of 5.to 10 cms. just to keep the broken charcoal pieces from floating and in position. Thus about three quarters of the drum is filled with the filter medium.

Water is poured from the top of the drum and filtered water is drawn through the tap at the bottom.

This technique can be cheaply used by filling the filter medium in a pitcher with a number of holes in the bottom, which is placed on an empty pitcher in which the purified water is collected. Water poured into the top pitcher filters through the filter medium and trickles into the lower pitcher. (Fig.52.3)

Note: It is advisable to add a few drops of chlorine solution (5.25%) to a jug of water as a disinfectant.

Approximate price Range: Rs 20 - 25 for pitcher & Rs 50 - 75 for drum filter.

Source: NEERI, National Environmental Engineering Research Institute, Nagpur, Maharashtra, (INDIA).





Fig.1. KATAKA SEEDS

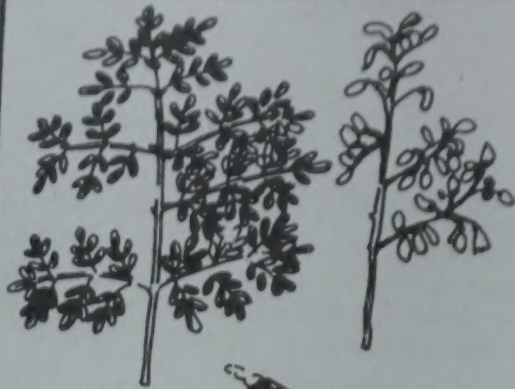


Fig.2. DRUMSTICKS

Fig.6. LOTUS LIKE WATER-PURIFYING AQUATIC PLANTS  
(KOLATTAMARA: MALYALAM)

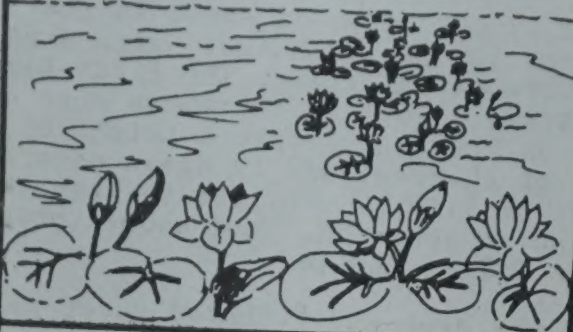


Fig.4



WATER PURIFYING SEEDS

STRYCHNOS  
POTATOTUM  
SEEDS

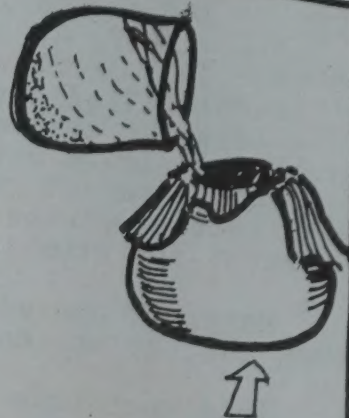
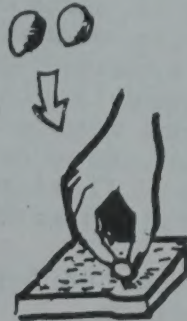


Fig.3

DUSTING WITH  
'ELAKHI: HINDI

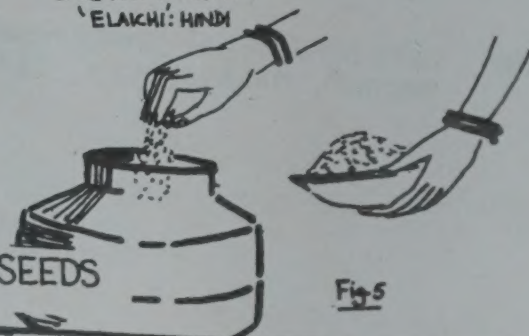


Fig.5



## TRADITIONAL WATER PURIFYING SEEDS

Description: Traditional water purification techniques cover aspects of water supply which dispute a host of efforts to find technical solution ensuring good potable water, have been usually overlooked. Six simple techniques which have been traditionally utilized and are scientifically proven safe are given below:

### Process:

- (i) Among the "seven modes of purifying water" Sushruta teaches that muddy water should be purified with a "natural coagulant" such as "kataka" seeds (Strychnos potatorum) (Fig.53.1). These can be used as effective coagulants and in a dose of 1.5 mg. per litre of water where the seed extract is prepared from a thick paste of crushed seed with clean water and used the same day. After stirring for 3 to 5 minutes the water is to be treated with alum (10-15 mg per litre).
- (ii) Morenga olifera (drumstick): is distributed throughout the tropics in South-East Asia, Africa, and America. The use of its seeds as coagulant is a Sudanese discovery. (Fig.53.2). After removal of wings and coat of the seed, the white kernel is crushed in a mortar and the powder mixed with a small amount of already purified water in a glass and stirred fast with a spoon for about 5 minutes. The suspension is poured through a tea strainer on the turbid water in a water jar and slowly stirred by a wooden twirling stick for ten minutes (The dose for a jar of 40 litres = 30 seeds).
- (iii) In southern Kerala, wiry roots of the rhizome from the "ramachham" (Malayalam): Vetiveria zizanoides are laid in a clay jar which has a few tiny holes in its bottom. Water filtered through this layer of roots is not only clearer but also has a pleasant smell. (Fig.53.3).
- (iv) Coagulation with mucilaginous material and thick paste: In Central India Strychnos potatorum seeds of substitute "clearing nuts" like the seeds of Semacarus anacardium (Hindi Bhela) are rubbed on a stone and made into a thick paste which is immersed in the turbid water (Fig.53.4).
- (v) Coagulant dusted on water surface: Dusting is mainly carried out with plant ashes, earth from termite hills, paddy husks or crushed seed coats from, for example 'elaichi' (Hindi); Elettaria cardamum (Southern India). Stirring improves the clarity of water (Fig.53.5).
- (vi) Introduction of higher aquatic plants: In Northern Kerala lotus-like aquatic plants called "kolattamara" in Malayalam (Nelumbium) are introduced into ponds and wells polluted with animal wastes. Water drawn from such a source is considered to be clearer than before and to have lost its bad smell and taste. Similar practices are found in the Madras area. (Fig. 53.6).

### Source:

Samia A l Azaria John,  
Care German Agency for Technical Cooperation,  
Post Box 5180, Eschborn (West Germany).



## SOLAR WATER STILL

Description: There are areas in the country where water, though available, is brackish or for some other impurities, not potable. This leads to diseases and ill-health. Distilled water is an ideal answer but too costly a proposition because fuel is scarce. M.C.R.C, Madras has developed a very cheap device which has been tested in the field and can be used by individual families to get their supply of safe drinking water (Fig.54).

Construction: As per the diagram with the following technical details:

|           |   |
|-----------|---|
| Location  | : Madras (South India)<br>Longitude: 80.18 E<br>Latitude : 13.00 N<br>Altitude : 16 MASL  |
| Water pan | : Outer diameter 910 mm<br>Area : 0.657 sq.m.<br>Material : G.T.<br>Weight : 10 kg.   |
| Twin cone | : Top cone slant: 60°<br>Condensation (top cone) area: 314 m <sup>2</sup><br>Bottom cone slant: 45°<br>Transparent sheet: * gauge - 1000<br>*polythene sheet<br>*Three replacements per year. |

Process: Solar still is a device used to convert saline, brackish, or other polluted water into drinking water. Basically a pan of impure water is enclosed, rather, encapsuled in a transparent twin cone enclosure. The trapped solar energy within the enclosure heats up the water causing evaporation and condensation on the inner face of the sloping transparent sheet of the upper cone. Condensing water droplets slide past the water pan and get collected in the bottom cone. This plastic conical still can be used for temporary installation, say for 4 to 5 months of the year. For continuous operation round the year, it would be necessary to replace the sheet-cone periodically. The yield by this solar still averages from 3 to 4 litres every day. The advantages of this solar still are: Automatic tracking, no orientation problem and no need for thermal insulators.

### Note:

- While installing the unit, keep the tray horizontal using washers for the foot-flangs.
- Once the unit is ready do not leave it in the sun, without water in the tray.
- While charging the unit, pour the water gently (without hurrying) till it just overflows.
- Clean the cones for dust deposition, once in three days by sprinkling clean water.
- Clean the tray once in a month.



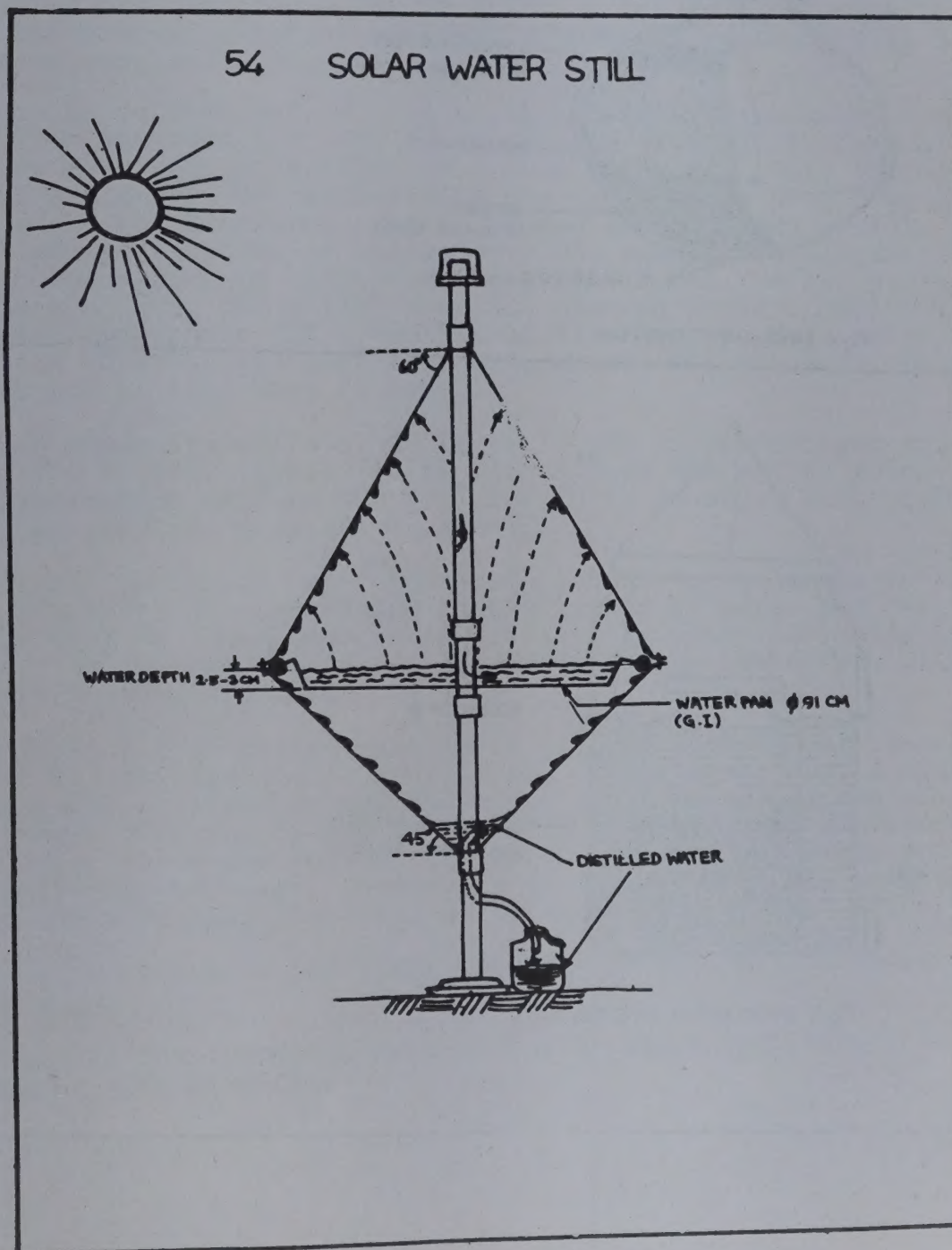
- Change the sheet cone periodically once it starts degrading.
- Treating the sheet with wetting agent, and adding black dye to the water may improve the performance.

Approximate Price Range: Rs 325 for material  
" 100 for labour

Cost of the distilled water based  
on the unit life of 3 years with 3 replacements of cones each year Rs 0.45 per lit. of  
distilled water

Pay back period: Five months

Source: Murugappa Chettiar Research Centre (M.C.R.C.)  
Madras 600113.





## 55 CHLORINATION POT FOR WELLS

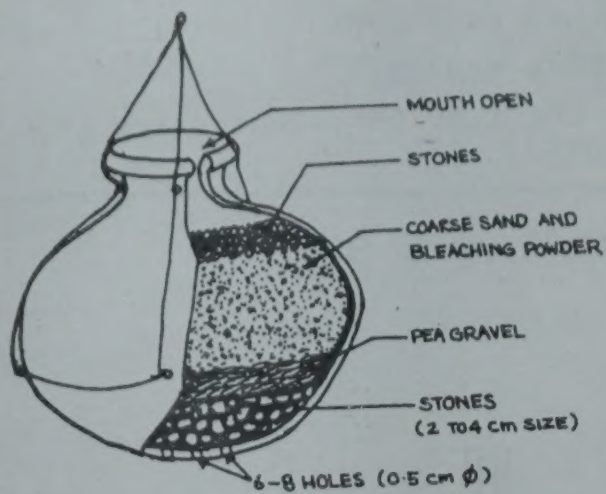


Fig-1 SINGLE-POT SYSTEM

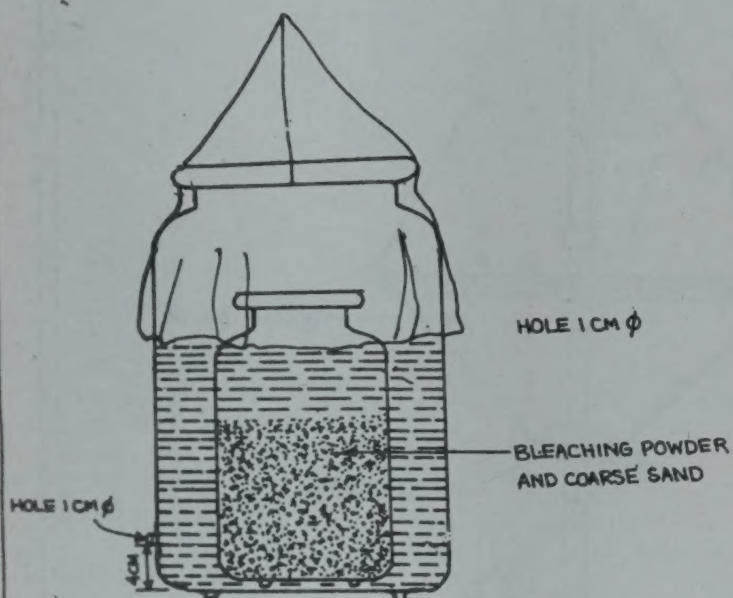


Fig-2 DOUBLE-POT SYSTEM



## CHLORINATION POT FOR WELLS

Description: Epidemiological studies have proved that the enteric diseases are water borne. Water treatment practices have contributed to a significant reduction in the incidence of these diseases. Wells form a major source of water supply in most villages. Surveys carried out by this Institute and by others have shown that open dug wells are invariably polluted.

Well water can be treated by the addition of bleaching powder or any other disinfectant every day but it is found impractical, hence a method or device that will give effective chlorination of rural wells for a longer period has been found out by NEERI. This is a chlorination pot which will effectively chlorinate water in open dug wells upto 21 days and thus becomes a manageable proposition.

Construction: An earthen pot of 7 to 8 litre capacity is taken. 6 to 8 holes of 0.5 cm diameter are made at its bottom (Fig.55.1). The holes are covered with stones or pebbles of 2 to 4 cm. size. This is then covered with pea gravel of smaller size. A dry mixture of 1.5 kg of bleaching powder and 3 kg. of coarse sand is placed over the pea gravel. The pot is then filled with pebbles or stones upto the neck to facilitate its immersion in the water. It is lowered in a well 0.9-1.2 m below water level (like the beam holding the pulley used for drawing water). Addition of sodium hexamethaphosphate (5% by weight of bleaching powder) helps in prolonging the chlorination period by keeping the mixture soft. This chlorination pot is thus easy to make.

Process: With community wells of 9,000 to 13,000 litres content and daily draw off of 900 to 1300 litres (40-60 litres/day) one pot is enough to give adequate chlorination (0.2 to 1.0 ppm) for 10 to 15 days. With higher draw-off rates, two pots are necessary per well.

For small household wells containing about 4,000 litres or less and having a withdrawal rate of 360 to 450 litres of water per day, the above method will be found to over chlorinate the water. For this purpose, a unit consisting of two cylindrical pots, one inside the other, will be found to work well (Fig.55.2).

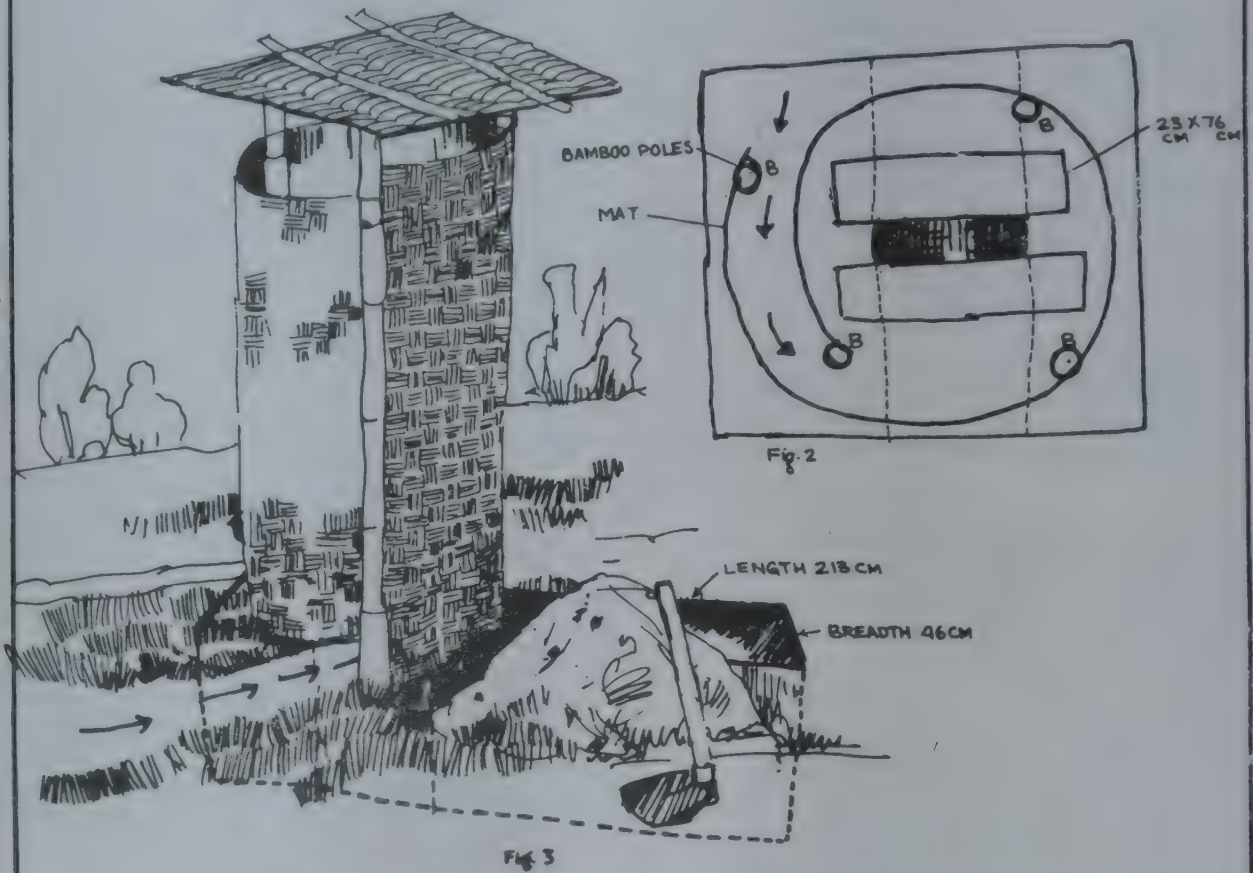
The inner pot is filled with moist mixture of 1 kg. of bleaching powder and 2 kg. of sand and is kept in the larger outer pot. A hole of 1 cm. diameter is provided in the inner pot as the level of the sand and bleaching powder mixture. In the outer pot a hole of 1 cm. diameter is provided 3 to 4 cm. above the bottom. The mouth of inner and outer pots are tied with polyethylene sheet. The system is lowered into the well as indicated above and will chlorinate the water for 2 to 3 weeks.

Limitations The system is not likely to work effectively in wells containing hard water.

Source: National Environmental Engineering Research Institute, Nagpur, (Maharashtra)



## TRENCH LAVATORY





## TRENCH LAVATORY

Description: Villagers consider it unhygienic to have a toilet inside the house. This is why they defecate in the open. This poses a great problem for women as they cannot go out during the day. They either have to get up much before dawn or answer the call of nature after dusk which makes them prone to dangers like snakes and insects or untoward incidents like rape.

Keeping all these problems in view, a very economical solution is the open air toilet, 'the trench lavatory'. It has the following advantages:-

- It is cheap
- Does not require any maintenance
- Requires minimal water
- Can be constructed in the backyard of the house or on the farm in very little space.
- Excreta provides a rich manure
- One does not feel suffocated inside the toilet (which is the reason why some village people avoid closed toilets).

| <u>Materials:</u> | <u>Quantity</u> | <u>Size (Length &amp; breadth)</u> |
|-------------------|-----------------|------------------------------------|
| Bamboo            | 4               | 7 ft. long                         |
| Wooden flats      | 4               | 5 ft. x 9 inches                   |
| Bamboo mat        | 2               | 7 ft. x 3 ft.                      |

Construction: Dig a pit which is 7 ft. long, 1½ ft. broad and 2½ ft. deep (Fig.56.1). Take 4 bamboos 7 ft. long and fix them in the ground at a distance of one foot from the pit. (Fig.2). Place two wooden flats of 2 1/2 ft. length and 9 inches width over the pit with a one foot gap between them. Wrap a bamboo mat around the bamboo poles, half a foot above the ground. (Fig.56.2 & 56.3).

Build a light roof of bamboo mat sloping in such a manner that the rain water sliding down the roof does not fall inside the toilet.

Process: Make a heap of the mud dug out of the pit near the toilet and cover the excreta after every use of the lavatory by throwing this mud in 4 - 5 handfuls or using a shovel for this purpose. This checks the infestation by flies mosquitoes and also foul smell. The 7-foot trench can be used for two heaps of manure. When at the fixed point the trench gets filled up. Remove the upper structure and fix on the unused trench. Cover the filled trench with soil and open it after three months for taking out the manure, rich in nitrogen. Avoid making the toilet within a radius of 20 to 30 ft. from a source of drinking water like a well.

Source: Sewagram Ashram Pratisthan,  
Sewagram,  
Dist. Wardha (Maharashtra)



# 57 SOPA TOILET

Fig. 1

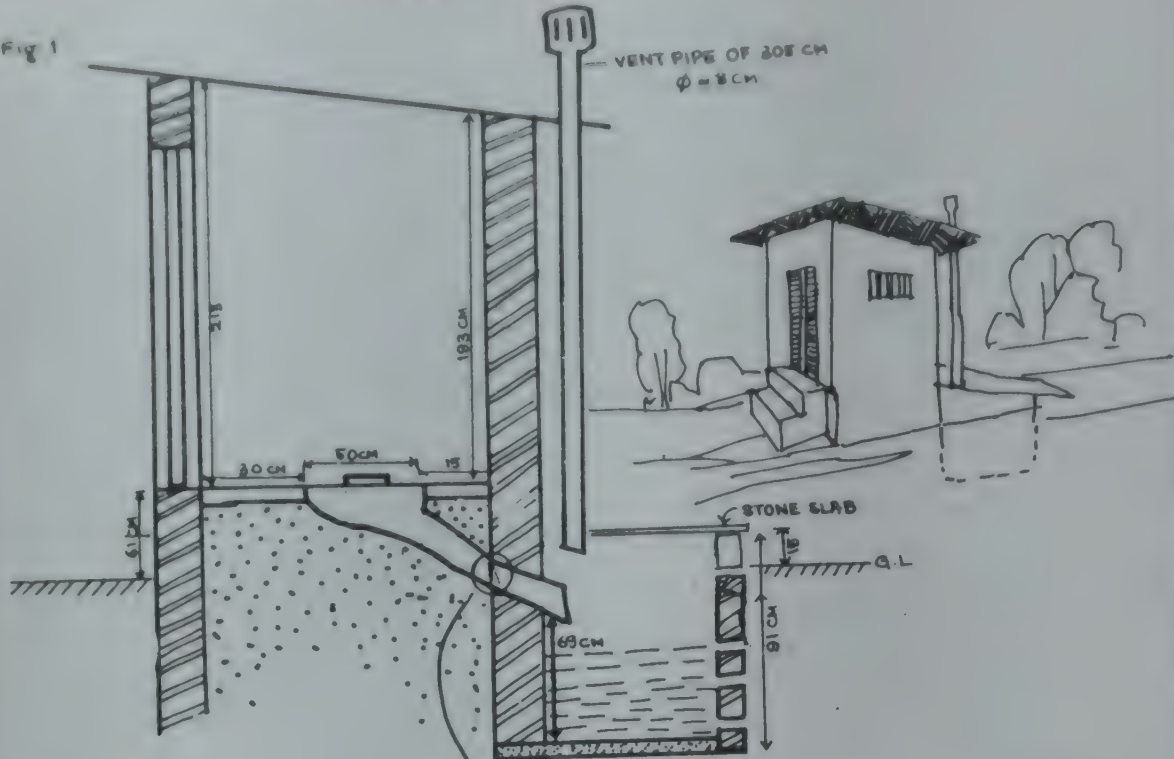
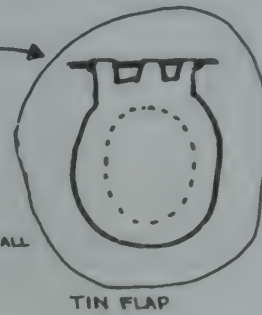
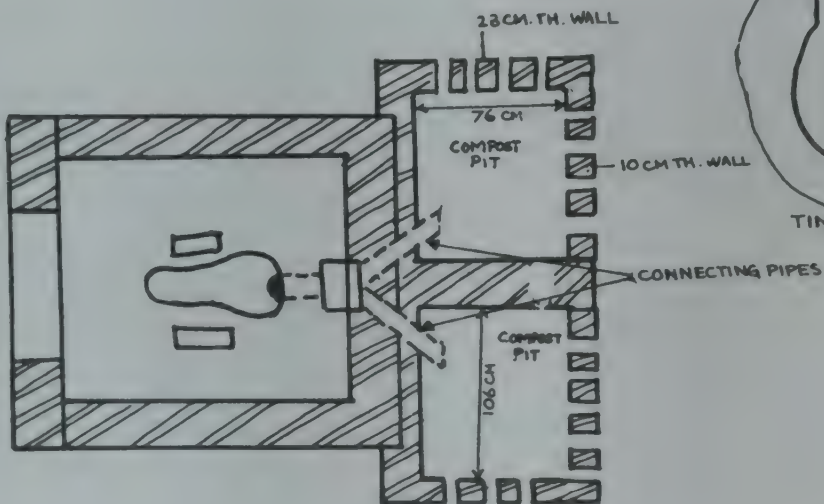


Fig. 2





## SOPA TOILET

Description: Sanitation is an acute problem both in rural as well as urban areas. In all those places where there is no sewerage system, the disposal of human excreta is a real nuisance. The privy bucket system is highly unhygienic and each time you pull the chain in a flush-latrine you waste 20 litres of water which is a colossal waste. Moreover septic tanks are beyond the means of most of the people. So, between these extremes an appropriate design, both cheap and hygienic, is evolved by Gandhi Smarak Nidhi, Pune. This hand flushed water-sealved optimum toilet called 'Sopa' (simple) 'Sandas' (lavatory) has the added advantage that safe manure by aerobic fermentation is also available.

### Materials:

|  |     |                    |
|--|-----|--------------------|
| Bricks   | ... | 1,200              |
| Cement   | ... | 150 kg             |
| Sand   | ... | 3 times the cement |
| Lavatory pan   | ... | Rs 60 per seat     |
| One clay or concrete connecting pipes                | ... | 4" Ø 1½' - 2       |
| One vent pipe  | ... | 3" Ø 10' - 1       |
| Pit cover (stone slab or reinforced concrete slab).. |     | 4' x 3' - 2        |

### Construction: As per the diagram.

The two compost pits are first dug out (8' length 3 1/2' breadth and of 3 ft. depth). The wall connecting the lavatory is of 9" while the others are of 4" breadth. The middle wall separating the two pits is also of 4" width. In the three walls where disconnected brick structure is shown, the masonry is as usual but in every third layer these holes of 2" x 2" are kept for absorption of the moisture of the manure pit by the sides. The construction of the lavatory with the fitting of the seat pan is as usual except that there should be 6" - 7" of space between the seat end and the wall (Fig.57.1). There is a flap of tin attached to the exit end of the seat pan (see inset in Fig.57.1) which acts as a one way diaphragm and prevents flies and foul gases from coming out of the manure pit.

Process: The lavatory requires a very minimal input of water as the slopes to convey excreta are kept very sharp. Excess water also hampers composting, so water necessary for cleaning oneself is enough to flush. There are two pits to be used alternately. When one is filled up it is left to mature for full composting. To begin using the pits, first fill some leafy matter to one foot of the pit. This helps in composting. There are two pipes in 'Y' shape connecting the lavatory pan to the two pits. (Fig. 57.2). There is an arrangement whereby only one of these channels works. This should be adjusted when the pits are to be changed.

Approximate Price Range: It costs from Rs 500 to Rs 700 to construct sopa sandas (excluding the upper structure).

Source: Gandhi Smarak Nidhi  
Bhargi Mukti Yojana,  
Gandhi Bhawan,  
Kothrud, Pune-29.  
(Maharashtra)



## SOAK-PIT

Description: Be it a village, shanty town or outskirts of a big city - all generally lack sewage drains and proper sanitation system. Water coming out of village houses and wells collects in a muddy pool nearby and becomes a breeding ground for mosquitoes and other insects.

The soak-pit is a simple, cheap system which soaks water and transfers it after filtration, to the subsoil. It also prevents the growth of germs in stagnant pools of water and thus keeps the environment clean. With a little care a soak-pit can last for 15 to 20 years without choking. The pit built next to a house can soak on an average 20-30 buckets of household effluents and a bigger pit made near a well will soak upto 200 to 300 buckets of water per day. A soak-pit works efficiently in all kinds of soils except in the rocky ones.

Materials: Boulders, stones and pebbles, gravel or thick sand; mud, jute-cloth or jute-bag; an old mud pitcher, a discarded tin can; coconut fibres or dry grass; 'Jamun' or palm branches which do not get affected by water and a  $1\frac{1}{2}$  ft. long semi-circular tin drain.

### Household Soak-Pit:

(1) Dig a pit exactly below the exit of the household drainage (i.e from where the dirty water from kitchen or bathroom comes out). It should be about one foot away from the wall.

The pit is to be 3 ft. long 3 ft. broad and 2  $\frac{1}{2}$  ft. deep at the end near the house and 3 ft. deep at the far end to attain a gradual slope for the smooth flow of water (Fig.60.1).

(2) Select three sizes of stones for filling the soak pit: boulders (Papaya-sized) stones (Guava sized) and pebbles (lemon sized). Fill the pit upto a height of one foot with boulders, covered by stones for the next one foot, deep, on which are laid pebbles one foot deep. Keep some space between the stones rather than crowding them so that filtration of drain water is faster. (Fig.60.2).

(3) The exact spot where the drain-water falls into the pit, is to be fitted with a 'Cleansing-pitcher'. For this clear up a one foot broad and one foot deep cavity in the stones for placing the pitcher.

(4) Now, cover the pit with 'Jamun' or palm branches (jamun and palm branches do not easily rot in water). These branches should be placed in a criss-cross manner, leaving the 'cleansing-pitcher' space uncovered.

(5) Take an old jute-bag and cover the branches with these bags. Repeat the criss-crossing of branches on top of this jute layer.

(6) Wet the mud (dug out of the pit), fill this clay in an iron basin and throw it with force on the branches so that a thick clay layer completely covers the pit.

(7) Give a final 3 to 4 inch thick coating of gravel atop the mud layer.



## SOAK-PIT

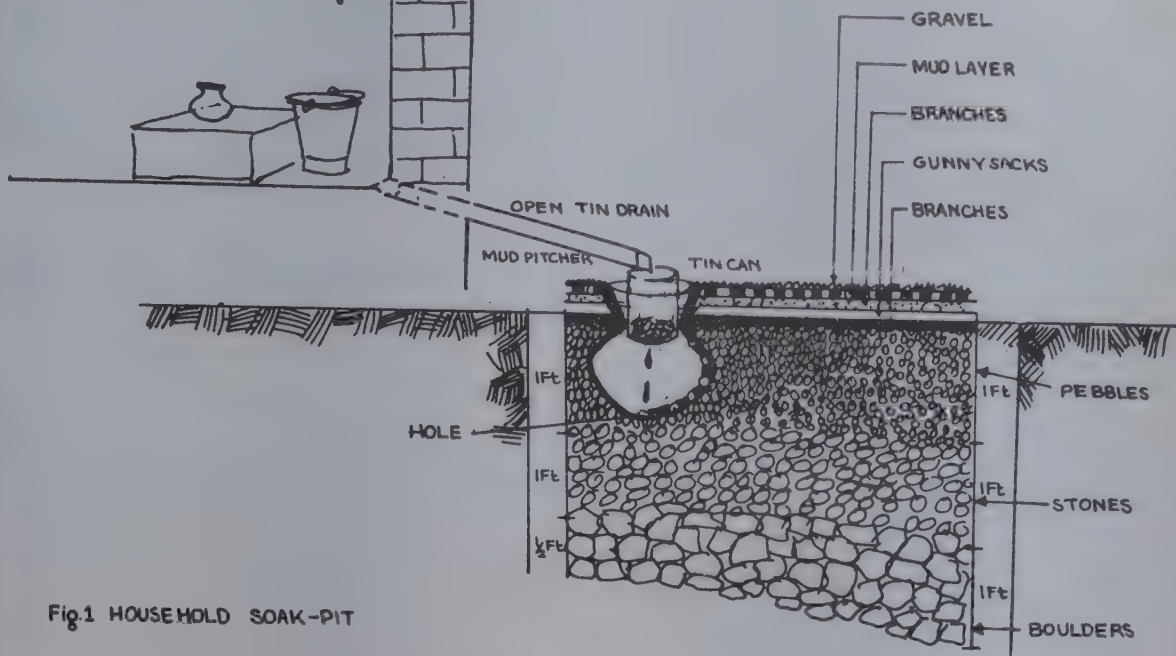


Fig.1 HOUSEHOLD SOAK-PIT

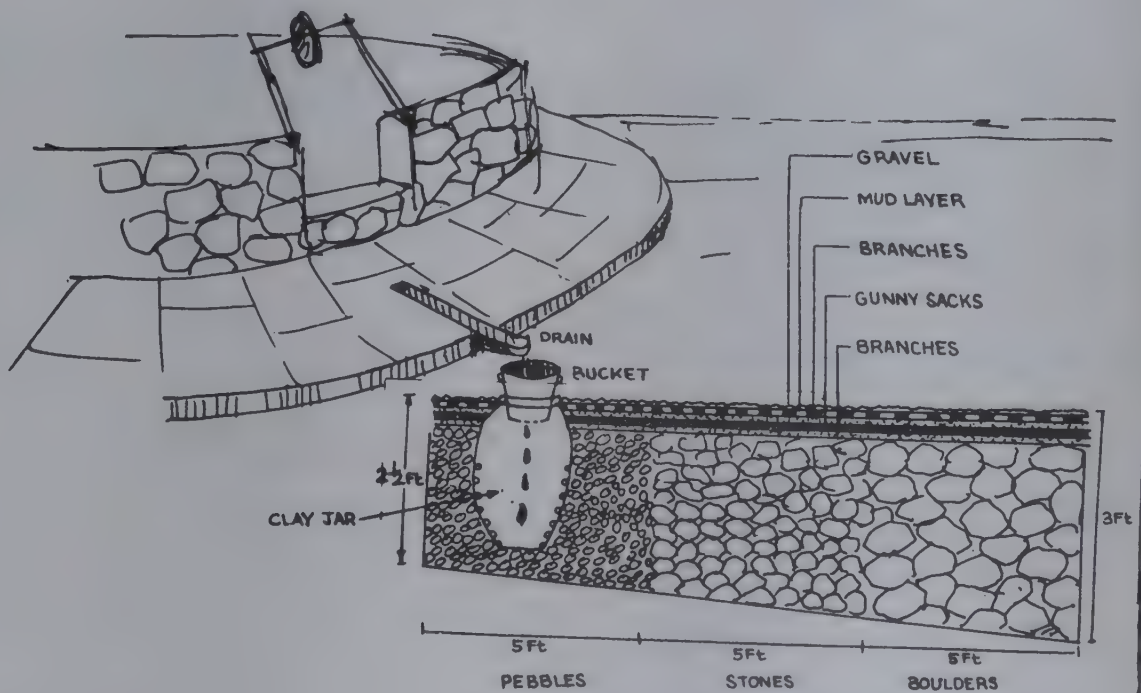


Fig.2 WELL SOAK-PIT



(8) Take an old mud-pitcher. The diameter of its mouth should be big enough to allow the passage of a two-kilogram tin-can. Pierce five big hole in the bottom of the pitcher and also make holes in the bottom of the tin that is to be placed in it. Fill half the tin-can with coconut fibre, rope or dry grass. This is for checking the passage of dirt, soap, oil and solid particles into the soak pit. Now adjust this can in the neck of the pitcher in such a manner that only 3 inches of the can is inside the pitcher and the rest of it is outside. This eases the process of removing the can for periodical clean-up. Place the cleansing pitcher just below the drainage pipe. Fix the pitcher properly by embedding most of it in the stone-bed covering its sides with sand and gravel.

Fix a semi-circular drain at the exit of the drainage-hole in such a manner that the dirty water trickles down directly into the cleansing pitcher.

Note:

- 1) Clean the can once in a fortnight and when necessary replace the old grass and coconut fibre.
- 2) Wash the pitcher, along with the can, thoroughly once in two to to three months with water. Dry it and put the whole contraption back in the original place.
- 3) Ensure that the dirty water does not spill out anywhere but into the cleansing pitcher.

**Soak Pit for a Well:**

For a well, dig the soak-pit of 3' breadth and 15' length with depth of 2.5' on one side 3' on the other (as shown in the diagram). This is then to be filled in a manner different from the soak-pit constructed for a household and as shown in the diagram.

Appropriate Price Range: For household soak pit Rs 10 - 15, for well soak pit Rs 50 - 60.

Source: Centre of Science for Villages,  
Magan Sangrahalaya,  
Wardha-442 001

## NUTRITION & HEALTH IMPROVEMENT TECHNOLOGIES

Eighty percent of the Health Budget is used to cure the illness of a minority through the training of doctors who are usually men, (Men take decision about family planning, women the consequences). 80% of all illness can be prevented by better nutrition, water supply and immunisation and preventive health education, the responsibility for which is usually taken by women.

minority





## BREAST-FEEDING

Description: Breast milk is the best and purest food for babies. It is better than any baby food or formula. Incidences of diarrhoea & other infection can be prevented if the baby is given breast milk during the first 2-4 months (Fig.61.1 & 61.2).

If the mother's breast does not produce enough milk:-

- The mother should drink a lot of water or liquid. The more liquid she drinks, the more milk she will produce.
- The mother should eat foods with proteins and vitamins - beans, dark green leafy vegetables, papaya, garlic, meat, milk cheese, eggs and dried fish; this will increase milk secretion.

If the mother's breast does not give any milk:-

- Have her drink a lot of liquids and eat better. Let the baby suck her breasts often. Some times her breasts will begin to make milk.
- If this does not work, give the baby some other type of milk-like cow's milk, goat's milk, buffalo's milk. A little sugar may be added to whatever kind of milk the baby is given. Whatever type of milk is used, always add some boiled water. (Fig.61.3). If non-fat (skimmed) milk is used, add a tablespoon of cooking or vegetable oil to the formula.
- Always boil the milk and water. It is safer to feed the baby with a cup and spoon than to use a baby bottle. Baby bottles and nipples are difficult to keep clean and cause many infections, including diarrhoea. If a bottle is used, bottle and the nipple, should be boiled each time before the baby is fed.
- If there is not enough money to buy milk for the baby, make a porridge from rice, cornmeal, or other cereal. Always add to this some skinned beans, eggs, meat, chicken, or other protein. These should be well-mashed and given as a liquid.

Cornmeal or rice water alone is not nutritious enough for a baby. The baby will not walk properly or speak on time. He will get sick easily and may even die. The baby must have some form of protein.

From 2 months to one year of age:

1. Continue to give the baby breast milk, if possible, till he reaches 2 years of age.
2. When the baby is 2 months old the mother should begin with supplementary feeding. The food should be well cooked & mashed. Though the baby initially rejects the food, but with time a taste develops. Inexpensive nutritious feeding can be made by combining at least one food from each of the following groups:



(61)

# BREAST FEEDING

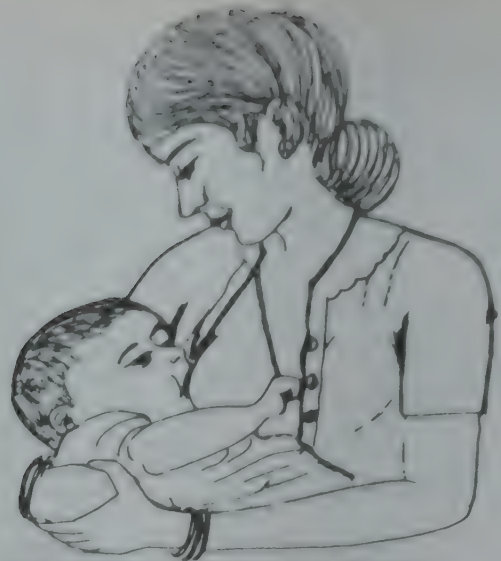


Fig 1

ONLY BREAST MILK SHOULD BE FED TO YOUR BABY FOR THE FIRST TWO TO FOUR MONTHS



Fig. 2

NEVER GIVE BABY FOOD AS IT MAY CAUSE DIARRHOEA, DEHYDRATION & INFECTIONS

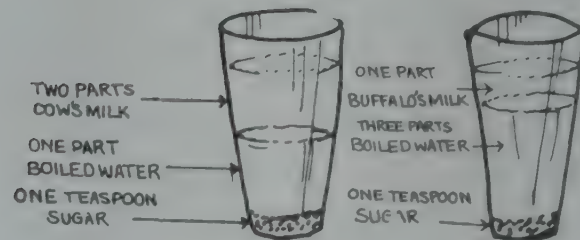


Fig 3

TWO EXAMPLES OF CORRECT FORMULA IF BREASTMILK IS UNAVAILABLE

| <u>Staple foods</u> | <u>Protein foods</u>                       | <u>Concentrated energy foods</u> | <u>Foods with vitamins &amp; minerals</u> |
|---------------------|--|----------------------------------|---|
| Wheat               | Pulses                                     | Fats                             | Dark green                                |
| Rice                | Peas                                       | Oils                             | leafy vegetables                          |
| Ragi                | Beans                                      | Cheese                           | Fruits                                    |
| Jowar               | Groundnuts                                 | Butter                           | Animal products like                      |
| Bajra               | Soyabeans                                  | Ghee                             | milk, eggs                                |
| Potato              | Dark green leafy vegetables                | Jaggery                          | fish, meat                                |
| Tapioca             | Animal products like milk, eggs fish, meat | Honey                            |   |
|                     |  | White sugar                      |   |

Some of the examples of balanced diet/feeds containing combination of different kinds of food are given below:

- 2 to 4 months: Water in which dal and green leafy vegetables have been boiled and cooked with a little jaggery and milk.
- 4 to 6 months: Well-cooked dal mashed and mixed with a mashed chapati or mashed rice.  
Well-cooked green leafy vegetables, mashed bananas, papaya or other ripe fruits, half boiled egg yolk mixed with a little milk or mashed chapati. Porridge made of dalia, wheat, ragi jowar and other staple foods.
- 6 to 12 months: Rice, mashed chapati mixed with dal, green leafy vegetables, milk, egg potato and ripe fruits.

Caution: The time when children are most likely to become malnourished is between six months and one year of age. It is dangerous because they often do not show any signs of malnutrition. Even a mild infection like a cold can make them severely malnourished. They must be given more food. By six months a baby should eat 5 to 6 times a day.

One Year & older: After a child is one year old, he can eat the same foods as adults, but should also drink milk whenever possible.

Try to give the child food with plenty of proteins, vitamins, iron and minerals every day, so that he will grow up strong and healthy.

Children and candy: Do not accustom small children to eating chocolates and sweets or taking soft drinks. When they have too many sweets, they no longer want the food that is better for them. Also, sweets are bad for their teeth.

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## EYE-CARE

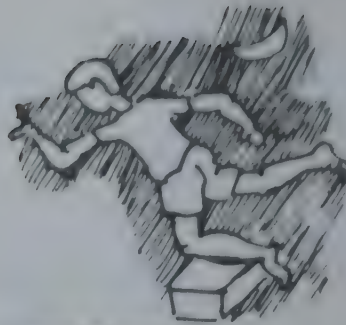


Fig. 1 NIGHT-BLINDNESS



Fig. 2 DRY EYES (XEROSIS)



Fig. 3 CORNEA ALSO BECOMES DRY AND DULL

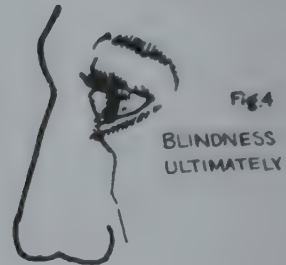


Fig. 4  
BLINDNESS  
ULTIMATELY

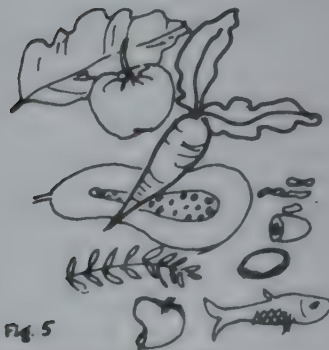


Fig. 5  
FOOD RICH IN VITAMIN A

## EYE-CARE

### Night Blindness & Xerosis (Vitamin 'A' deficiency):

This eye disease is most common in children between 2 to 5 years of age. It results from not eating enough foods with vitamin A. If not recognized and treated early, it can make the child blind.

#### Signs:

At first, the child may have night-blindness. He cannot see in the dark as other people can. (Fig.62.1)

Later, he develops dry eyes (xerosis). The white of the eyes loses its shine and begins to wrinkle (Fig. 62.2).

Patches of little grey bubbles (Bitot's spots) may form in the eyes. As the disease gets worse, the cornea also becomes dry and dull, and may develop little pits. (Fig.62.3)

Then the cornea may quickly grow soft, bulge, or even burst. Usually there is no pain. Blindness may result from infection, scarring, or other damage. (Fig. 62.4).

Xerosis often begins, or gets worse, when a child is sick with another illness like diarrhoea, whooping cough or tuberculosis. Examine the eyes of all sick and underweight children.

#### Prevention and treatment:

Xerosis can easily be prevented by eating foods that contain Vitamin A. Do the following:

Breast feed the baby upto 2 years, if possible.

After the first 6 months, begin giving the child foods rich in Vitamin A, such as dark green leafy vegetables and yellow or red fruits and vegetables. (Fig.62.5). Whole milk, eggs, liver, and kidneys are also rich in Vitamin A.

If the child is not likely to get these foods, or if he is developing signs of night blindness or xerosis, give him a capsule of vitamin A, once every 6 months. Do not give it to babies under 6 months of age.

If the condition is already fairly severe, give the child a 200,000 unit capsule of Vitamin A. If the eyes are not well in a week, give another capsule.



## WEANING FOODS

Description: After 3 to 4 months of child-birth, mother's milk has to be substituted with semi-solid foods for the growing infant. These foods are called weaning foods. A number of weaning foods can be prepared at home. Some of the preparations are as follows:

### 1. Sago Kanji.

|                       |       |        |
|-----------------------|-------|--------|
| Sago                  | ..    | 25 gm  |
| Roasted Bengal Gram.. | 25 gm |        |
| Jaggery               | ..    | 25 gm  |
| Water                 | ..    | 2 cups |

Method: Roast sago and powder the Bengal gram. Add sago to 1½ cups of boiling water and cook. Prepare a batter of Bengal gram powder in half a cup of water and pour it into the cooked sago, stirring continuously. Cook for 10 minutes, add jaggery and cook for five minutes again.

### 2. Porridge of Wheat:

|                 |    |       |
|-----------------|----|-------|
| Dalia: porridge | .. | 50 gm |
| Sugar           | .. | 15 gm |
| Milk            | .. | 50 gm |

Method: Roast the wheat dalia and add it to boiling water containing two bay leaves and cook till soft. Add sugar and boiled milk, and serve.

### 3. Ragi Porridge:

|                    |    |             |
|--------------------|----|-------------|
| Ragi flour roasted | .. | 50 gm       |
| Bengal gram dal    |    |             |
| flour (roasted)    | .. | 4 teaspoons |
| Groundnut cake     |    |             |
| powder (roasted)   | .. | 4 teaspoons |
| Jaggery            | .. | 20 gm.      |

Method: Boil the jaggery solution. Mix ragi and Bengal gram flour and make a batter with hot water. Pour the batter slowly into the jaggery solution, stirring continuously. Boil for 10 to 15 minutes. Serve warm.

### 4. Bajra Infant Food:

|                  |    |                    |
|------------------|----|--------------------|
| Bajra            | .. | 50 gm              |
| Green gram/Hara  |    |                    |
| Chana Dal        | .. | 3 teaspoons        |
| Milk Powder      | .. | 2 teaspoons        |
| Groundnuts       | .. | 2 teaspoons        |
| Gingil/Til seeds | .. | 1 "                |
| Sugar or salt    | .. | According to taste |

Method: Clean and dehusk bajra. Roast and powder bajra, green gram dal, groundnut and til seeds, each separately. Mix all the powders and store in an air-tight container. Whenever required, mix the powder with boiling water or milk to the desired thickness. Add salt or sugar.

5. Ragi Addai - Sweet:

|                         |    |             |
|-------------------------|----|-------------|
| Ragi Flour              | .. | 30 gm       |
| Roasted Bengal gram dal | .. | 3 teaspoons |
| Jaggery                 | .. | 15 gm       |
| Grated coconut          | .. | 1 teaspoon  |
| Oil                     | .. | 2 "         |
| Water                   | .. | 3 "         |

Method: Dissolve jaggery in water. Add Bengal gram flour, ragi flour and coconut scrapings to the jaggery solution and make a thick paste. Prepare the addai on a greased iron pan.

6. Cholam (Jowar) Pittu:

|                               |    |         |
|-------------------------------|----|---------|
| Cholam Flour                  | .. | 30 gm   |
| Roasted Bengal gram dal flour | .. | 25 gm   |
| Grated Coconut                | .. | 5 gm    |
| Jaggery                       | .. | 20 gm   |
| Salt                          | .. | 1 pinch |
| Water                         | .  | 2 cups. |

Method: Mix cholam flour, Bengal gram flour, coconut scrapings and salt together. Sprinkle two table-spoons water and then mix and steam for 15 minutes. Mix jaggery powder and serve.

(Source: National Institute of Nutrition, Hyderabad)

7. Multipurpose Food:

Method: Edible groundnut cake and Bengal gram dal are optimally roasted to improve their flavour characteristics and nutrition value. Both are ground separately and mixed in a proportion of 3:1. The blend is then fortified with vitamins and minerals. The product is ideal as a protein food supplement. (Source: CFTRI, Mysore).

8. Energy Food:

Wheat  
Bengal Gram dal  
Edible groundnut cake

Method: Energy food is made from ingredients which are partially cooked and hence does not need elaborate cooking. It is prepared from indigenously available raw materials such as wheat, Bengal gram flour, oilseed meal flours, jaggery, minerals and vitamin premixes. The process comprises cleaning, roasting and grinding of various ingredients added to ground jaggery and slightly cooked when needed.

(Source CFTRI, Mysore)

9. Hyderabad Mix:

|                         |    |       |
|-------------------------|----|-------|
| Wheat                   | .. | 70 gm |
| or Jowar                | .. | 35 gm |
| Bengal gram dal         | .. | 11 gm |
| Groundnut               | .. | 6 gm  |
| Jaggery                 | .. | 10 gm |
| Deflated Soyabean flour |    | 6 gm  |



Method: Groundnuts, jowar (or wheat), gram dal is cleaned, roasted grinded and mixed with jaggery and soyabean flour. This contains 10 gms protein, 25 gm calories and vitamin A-50 IV, making it an effective and cheap nutritive food substitute.

#### 10. Ragi Malt:

Method: Ragi Malt is one of the best beverages. Ragi is cleaned and soaked in water for 12 hours. The water is drained off and soaked ragi is kept tied in a cloth till the grains germinate. The germinated seeds are then dried in sun and lightly roasted in a pan till a light and pleasing aroma emanates from the contents. It is then ground into fine powder which can be used with milk and sugar as and when required.  
(Source: NIN, Hyderabad).

#### 11. Soyabean-based Baby Food:

Method: A highly nutritious and cheap food for babies, while changing from mother's milk to cereals is called 'Soyabean Food.'. The new preparation contains 23% protein, 20% fats, over 50% carbohydrates, 5% calcium and 1.5% moisture. It is prepared from soyabean containing milk protein, and is fortified with vitamins and iron, providing significant quantity of high protein necessary for the fast-growing tissues of a child's body. It contains 368 calories per 100 mg and costs about Rs. 8 per kg.  
(Source: NDRI, Karnal).

### DENTAL-CARE

To keep teeth and gums healthy eat foods like amla, orange, lemon, guava, sprouted gram, tomato. These contain the vitamins which are necessary to keep the gums healthy. Ragi and bajra contain calcium which makes teeth strong. If possible, include some milk in your diet.

#### If you do not have a toothbrush :

1. Use a twig of a neem tree, sharpen one end to clean between the teeth and chew on the other end and use the fibres as a brush (Fig.64.2)
2. Or tie a piece of rough towel around the end of a stick, and use it as a toothbrush.

#### If you do not have toothpaste :

1. Make a tooth powder by mixing salt and bicarbonate of soda in equal amounts. To make it stick, wet the brush before putting it in the powder. (Fig. 64.1)
3. Salt with soda works as well as toothpaste for cleaning teeth. If you do not have bicarbonate of soda, just use plain salt.

#### Toothache :

- Chew one or two cloves, and let the juice remain in the mouth for some time.
- Chew one or two cashew leaves and let the juice remain in the mouth.
- Tooth-powder made of burnt mango leaves also helps in reducing toothache.

These remedies only relieve pain. Consult the health worker to find out if the tooth needs to be filled or removed.

#### Pyorrhea - A disease of the gums :

Inflamed (red and swollen), painful gums that bleed easily are caused by :

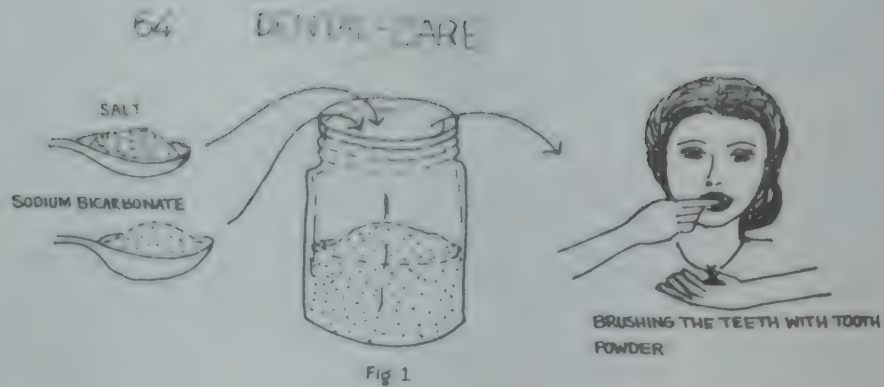
1. Not cleaning the teeth and gums well or often enough.
2. Not eating enough nutritious foods (malnutrition).

#### Prevention and Treatment :

Brush teeth well after each meal, removing food that sticks between the teeth. Also, if possible, scrape off the dark yellow crust (tartar) that forms where the tooth meets the gums. Then rinse the mouth with warm salt water.



Eat preventive foods rich in vitamins, especially eggs, meat, beans, dark green vegetables, and fruits like oranges, lemons and tomatoes. Avoid sweet, sticky, and starchy foods that get stuck between the teeth.



## BIRTH-CONTROL

Every land has 'home remedies' for preventing or interrupting pregnancy. Unfortunately, most either do not work or are dangerous. For example, some women think that to wash out the vagina or to urinate after having sex will prevent pregnancy, but this is not true.

1. Breast Feeding: While a woman is breast-feeding her baby she is less likely to become pregnant - especially when breast milk is the food her baby receives. The chances of her becoming pregnant is much greater after 4 to 6 months, when the baby begins to get other foods in addition to breast milk. To be more sure that she does not become pregnant, the mother who is breast-feeding should begin some method of birth control when the baby is 3 to 4 months old. The earlier she begins the surer it will be. (Before the baby is 6 months old, a method other than birth control pills is better because the pills cause some women to produce less milk):

2. The Diaphragm : is a shallow cup made of soft rubber. A woman wears it in her vagina while having sexual relations. It should be left in for a least 6 hours afterwards. It is a fairly sure method, especially if used together with a contraceptive cream or jelly. A health worker or midwife should help fit the diaphragm, as different women need different sizes. (Fig 65.1 & 65.2) Check the diaphragm regularly for holes and get a new one each year. They are not expensive.

3. The Intrauterine Device (IUD) : is a plastic (or sometimes metal) object which a specially trained health worker or midwife places inside the womb (Fig. 65.3) While in the womb, it prevents pregnancy. However, IUDs sometimes fall out of some women. After every menstrual period check if the IUD is still in place. In other women they cause pain, discomfort, and sometimes serious problems, but for some women they give no trouble at all. For these women, the IUD may be the simplest and most economical method.

4. Sterilization : For those who never want to have more children there are fairly safe and simple operations for both men and women. In our country these operations are free. Ask at the health centre:

- For men, the operation is called a vasectomy. It can be done in a doctor's office or a health centre. Small cuts are made so that the tubes from the man's testicles can be cut and tied.

The operation has no effect at all on the man's sexual ability or pleasure. His fluid comes just the same, but has no sperm in it.

- For women, the operation is called a tubal ligation which means to tie the tubes. (Fig 65.4) It can be done simply and quickly, and usually without putting the woman to sleep. One method is to make very small cuts in the lower belly so that the tubes coming from the ovaries, can be cut and tied.

This operation has no effect on the women's menstrual periods or sexual ability, and may make having sex more pleasant because she does not have to worry about becoming pregnant.





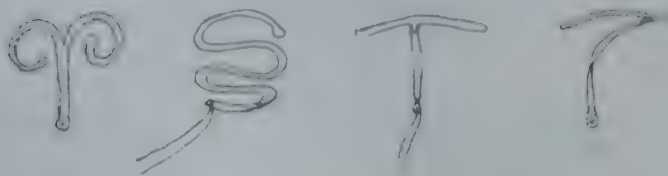
HOLDING THE DIAPHRAGM

Fig. 1



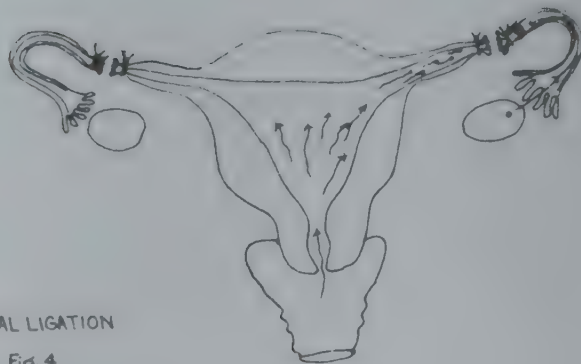
FITTING THE DIAPHRAGM IN PLACE

Fig. 2



INTRA-UTERINE DEVICES (IUD'S)

Fig. 3

EXTERNAL  
II. SCISION

TUBAL LIGATION

Fig. 4

5. Birth Control Pills (Oral Contraceptives): When taken correctly, the 'pill' is one of the most effective methods for avoiding pregnancy. However, certain women should not take birth control pills if they can use another method. If possible birth control pills should be given by health workers, midwives or other persons trained in their use.

How to take the pills-packet of 21 : Take the first pill on the fifth day from the beginning of the period, counting the first day of the period as day 1. Then take one pill every day until the packet is finished (21 days).

After finishing the packet, wait for 7 days before taking any more pills. Then begin another packet, one pill each day.

This way, you will take the pills for 3 weeks out of each month, then go one week without taking any. Normally, the menstrual period will come during the week when the pill is not taken. Even if the period does not come, start the new packet 7 days after finishing the last one.

If you do not want to get pregnant, it is important to take the pills as directed - one every day. If you forget to take the pill one day, take 2 the next day.

Packet of 28 pills : Take the first pill on the fifth day of the period, just as with the packets of 21. Take one pill a day. Seven of the pills will probably be of a different size and colour. Take these pills last (one a day) after the others have all been taken. The day after you finish the packet of 28, start another packet. Take one a day without ever missing a day, packet after packet, for as long as you do not want to become pregnant.

No special diet must be followed when taking the pill. Even if you happen to get sick with a cold or something else while taking birth control pills, go right on taking them. If you stop taking the pills before the packet is used up, you may become pregnant.

Side effects : Some women get a little morning sickness, swelling of the breasts, or other signs of pregnancy when they first start taking the pill. This is because the pill contains the same chemicals (hormones) which are present in the blood when she is pregnant. These signs do not mean she is unhealthy or should stop taking the pill. They usually go away after the first 2 or 3 months.

Some women may bleed a different amount than usual in their monthly period when they are taking the pills. These changes are usually not important. Sometimes they can be corrected by changing to a brand with a different amount of hormone.

For most women, birth control pills are relatively safe. Certainly they are far safer than becoming pregnant. However, for some women both pregnancy and taking birth control pills have a higher risk. These women should use other methods of birth control.



### (ORAL - REHYDRATION)

Most children die from diarrhoea because they do not have enough water left in their bodies. This lack of water is called dehydration. Any child with acute diarrhoea is in danger of dehydration.

Dehydration results when the body loses more liquid than it takes in. This can happen with severe diarrhoea, especially when there is vomiting as well. It can also happen in very serious illness, when a person is too sick to take much food or liquid.

People of any age can become dehydrated but dehydration develops more quickly and is most dangerous in small children.

A baby needs water to drink, especially in hot weather. Often a mother does not give water to her baby till he is six months old. A baby cannot tell his mother he is thirsty, but needs water several times a day. The mother should take water from a clean source and keep it in a covered pot. If possible she should boil the water for her baby. Especially when the baby has diarrhoea or vomiting, he loses a lot of water from his body. He needs extra water many times a day.

It is important that everyone, especially mothers, know the symptoms of dehydration and how to prevent and treat it.

#### Symptoms

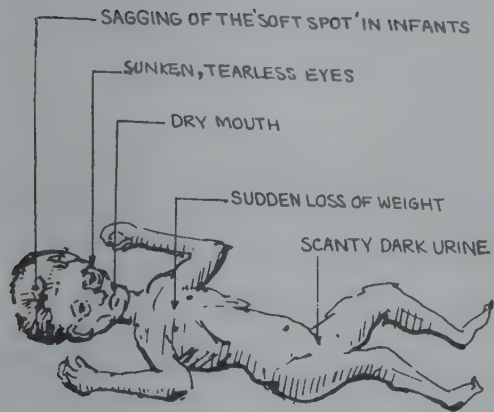
- little or no urine; the urine is dark yellow
- sudden weight loss
- dry mouth
- sunken, tearless eyes,
- sagging in of the 'soft spot' in infants
- Loss of elasticity of the skin. (Fig.66.1)

Very severe dehydration may cause rapid fall in pulse rate deep breathing, fever, or fits.

#### Prevention and treatment:

- Dehydration can usually be prevented if a person with diarrhoea, with or without vomiting, is given plenty of liquids or Rehydration Drink, the preparation of which is illustrated in Figs 66.2 & 66.3. This is especially important for small children with watery stools.
- A dehydrated person should drink large amounts of liquids: water, tea, soup, etc., but do not wait for dehydration to begin for this.
- Especially useful in the prevention and treatment of dehydration is the rehydration drink.

## 66 ORAL-REHYDRATION



SIGNS OF DEHYDRATION

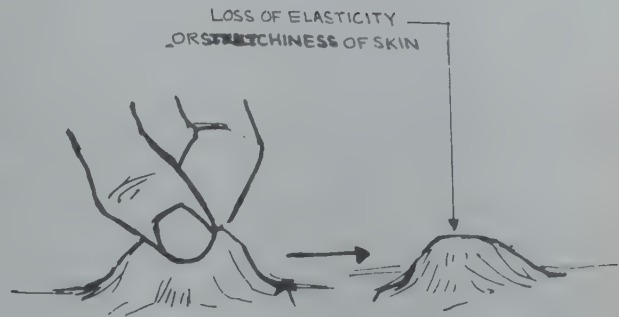


Fig. 1

### REHYDRATION DRINK - TO PREVENT AND TREAT DEHYDRATION :

IN 1 LITRE OF  
BOILED WATER

PUT

AND

+ 2 LEVEL TEASPOONS  
OF SUGAR OR HONEY

$\frac{1}{4}$  TEASPOON  
SALT

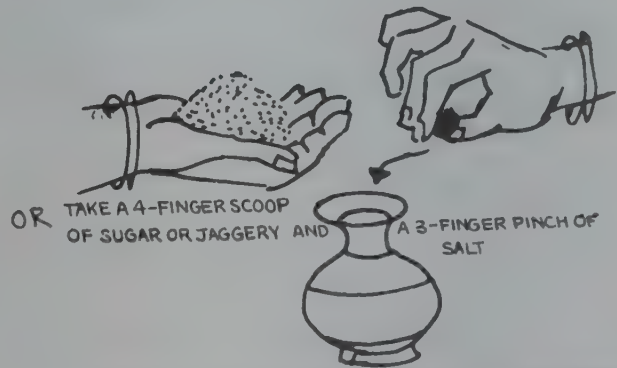


AND  
 $\frac{1}{4}$  TEASPOON  
BICARBONATE  
OF SODA



IF YOU DONOT HAVE SODA,  
USE ANOTHER  $\frac{1}{4}$   
TEASPOON SALT

Fig. 2



AND ADD IT TO ONE LITRE OF BOILED AND COOLED WATER

Fig. 3



Give the dehydrated person sips of this drink every 5 minutes, day and night, until he begins to urinate normally. A large person needs 3 or more litres a day. A small child needs at least one litre a day.

Keep giving rehydration drink often in small sips, even if the person is vomiting. If the dehydrated person cannot drink enough to correct the dehydration or if he vomits all the drinks, find a health worker who can give liquid through the veins (intravenous solution).

Health Departments of some countries supply rehydration mix in individual envelopes, for making 1 litre of rehydration drink. These mixes contain Glucose, instead of ordinary sugar or sucrose. Glucose is a simpler form of sugar that is more easily used by the child's body than regular sugar. Glucose also helps the liquid get into the baby's body more quickly. It is especially important to use glucose rather than sucrose if a child has very severe diarrhoea or is very malnourished. Standard rehydration mixes also contain potassium salt, which helps balance the ordinary salt.

If you can get both glucose and potassium chloride you can make the following Rehydration Drink or the one shown in the diagram :

Boiled water: 1 litre ( 4 cups)  
Glucose powder: 20 gm or 8 level teaspoons of ordinary salt.  
(Sodium chloride): 2 gm or  $\frac{1}{2}$  level teaspoon baking soda  
(Sodium Bicarbonate): 2 gm, or  $\frac{1}{2}$  level teaspoon potassium chloride, 1.5 gm. or  $\frac{1}{3}$  level teaspoon.

If you have glucose, but not potassium chloride, use only half the above amounts of salt and baking soda.

### DIARRHOEA AND DYSENTERY

When a person has loose or watery stools, he has diarrhoea. If mucus and blood can be seen in the stools, he has dysentery.

Diarrhoea can be mild or serious. It can be acute (sudden and severe) or chronic (lasting many days).

Diarrhoea is more common and more dangerous in young children especially in those who are poorly nourished.

Diarrhoea has many causes. Sometimes special treatment may be needed. However, most diarrhoea can be treated successfully at home, even if you are not sure of the exact cause or causes.

Preventing Diarrhoea : Although diarrhoea has many different causes, the most common are infection and poor nutrition. With good hygiene and good food, most diarrhoea could be prevented. And if treated correctly, fewer children who get diarrhoea would die. Children who are poorly nourished get diarrhoea and die from it far more often than those who are well-nourished. Yet diarrhoea itself can be part of the cause of malnutrition. And if malnutrition already exists, diarrhoea rapidly makes it worse. This results in a vicious circle, in which each makes the other worse. For this reason, good nutrition is important in both the prevention and treatment of diarrhoea.

The prevention of diarrhoea depends both on good nutrition and cleanliness. Many suggestions for personal and public cleanliness are given. These include the use of latrines, the importance of clean water, and the protection of foods from dirt and flies.

Some other important suggestions for preventing diarrhoea in babies:-

Breast feed rather than bottle feed babies: Breast feed babies for at least 2 years if possible. Breast milk helps babies resist the infections that cause diarrhoea. If it is not possible to breast feed a baby, feed should be given with a cup and spoon. Do not use a baby bottle because it is harder to keep clean and more likely to cause an infection.

- After 4 months start giving the baby new or solid foods. Start by giving just a little, and mashing it well. Give clean fresh food cooked just before eating. As the baby starts with solid food, excessive amounts may cause diarrhoea.
- Give the child rice and dal water, juices, coconut water.
- Keep the baby clean and in a clean place. Try to keep the baby away from putting dirty things in the mouth.
- Do not give babies unnecessary medicines.
- If there is no latrine, pass stool away from the house and the drinking water.



Treatment: In most cases of diarrhoea no medicine is needed. If the diarrhoea is severe, the biggest danger is of dehydration. If the diarrhoea lasts a long time, the biggest danger is of malnutrition. So the most important part of treatment has to do with giving enough liquids and good food. No matter what the causes of diarrhoea, always take the following precautions

1. Prevent or control dehydration : A person with watery diarrhoea must drink large amounts of liquids. If diarrhoea is severe or there are signs of dehydration, give him rehydration drink. Even if he does not want to drink, gently insist that he does so. The baby should take several swallows every few minutes.
2. Meet Nutritional Needs : A person with diarrhoea should be given food whenever the appetite is felt for it. This is especially important in small children or persons who are already poorly nourished:

A baby with diarrhoea should be breast fed.

A small or underweight child or anyone who is thin and weak, should get plenty of body building foods (proteins) and energy foods while suffering from diarrhoea - until cured. If he stops eating because he is too sick or is vomiting, he should eat again as soon as he can. Although giving food may cause more frequent stools at first, it can save his life.

If a child who is underweight has diarrhoea that lasts for many days or keeps coming back, give more food rich in protein. Often no other treatment is needed.

When an older child or an adult who is well-nourished has a severe case of acute diarrhoea, recovery may be quicker if the person is kept on a liquid diet of tea, broth, or Rehydration Drinks. But if the diarrhoea lasts more than one day, he should begin taking food.

#### When to seek Medical help in cases of Diarrhoea

Diarrhoea and dysentery can be very dangerous especially in small children. In the following situations you should get medical help :

- If diarrhoea lasts for more than 4 days and is not getting better or more than one day in a small child with severe diarrhoea.
- If the person is dehydrated and getting worse.
- If the child vomits everything he drinks, or drinks nothing.
- If the child begins to have fits, or if the feet and face swell.
- If the person was very sick, weak, or malnourished before the diarrhoea began (especially a little child or a very old person).
- If there is much blood in the stools, this can be dangerous even if there is little diarrhoea.

### HEALTH-SALTS

Calcium Fortified Salt : The concept of fortification of salt with nutrient is based on the fact that common salt is consumed by all sections of the society and provides the most convenient means for nutrients amongst the low and middle income groups. Extra calcium salts are required by lactating and pregnant mothers (Fig 68.5).

The average daily requirement of calcium is one gm per day. The rich source of calcium is milk, cheese, eggs, butter, oranges, nuts and carrots. It has been reported that 50% can be substituted through salt. On an average, the daily human consumption of salt is about 18-20 gm. The Institute has developed the process of fortification of salt. During the production of salt in solar salt pans, it is properly mixed with 10 percent of washed and powdered gypsum. After the salt bed of one inch thickness is formed, the powdered gypsum is sprinkled manually and thereafter the salt is raked at regular intervals. After attaining the suitable thickness of the bed of salt, it is harvested as usual. Calcium and vitamin D deficiency can often results in rickets. (Fig 68.4)

(Source : CSMCRI, Bhavnagar)

Iron Fortified Salt : The requirement of iron for the formation of R.B.C. (red blood corpuscles) and other metabolic activity is about 15 mg. A lower content results in anemia, the signs of which are shown in Fig 68.3. It has been reported that about 10 mg are available from the daily diet and remaining 5 mg has to be supplied by some external source. Common salt is mixed with 0.001% ferric pyro phosphate. The fortified salt will contain about one mg of iron per gm of salt consumed. The cost of production will be about Rs 30 per tonne.

(Source : NIN, Hyderabad)

Iodised Salt : Iodine has been found to be the essential component of thyroxine or tri-iodothyroxin. If a person does not get the required iodine from his diet to make up the normal amount of thyroxine, the thyroid gland may swell, resulting in goiter. (Fig.68.1)

In India, endemic goiter is prevalent in sub-Himalayan region ranging from Jammu & Kashmir to Assam. To combat this, the estimate requirement of iodised salt is about 3.5 to 4.5 lakh tonnes (Fig 68.2)

Iodised salt can be prepared by the submersion process. The salt after submersion in an iodate solution is either drained or centrifuged to get iodised salt containing 15 + 2 ppm. iodine.

(Source : CSMCRI, Bhavnagar)



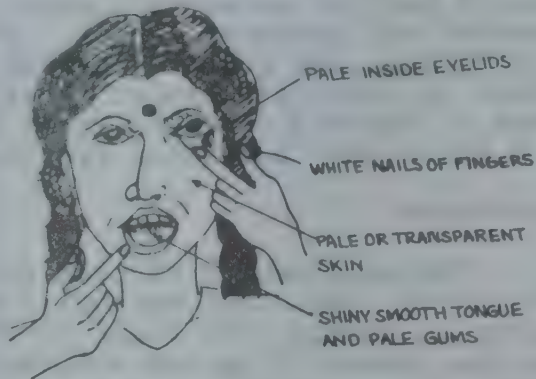


TAKE IODIZED SALT FOR  
GOITER PREVENTION  
Fig. 2



GOITER A SWELLING OR MASS ON THE THROAT  
MOSTLY CAUSED BY LACK OF IODINE IN DIET  
Fig. 1

IRON DEFICIENCY IN  
THE DIET LEAD TO  
ANEMIA



SIGNS OF ANEMIA Fig. 3

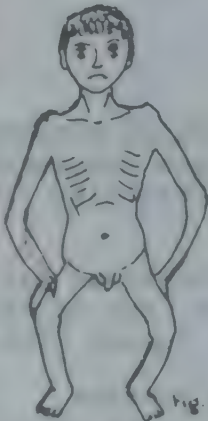
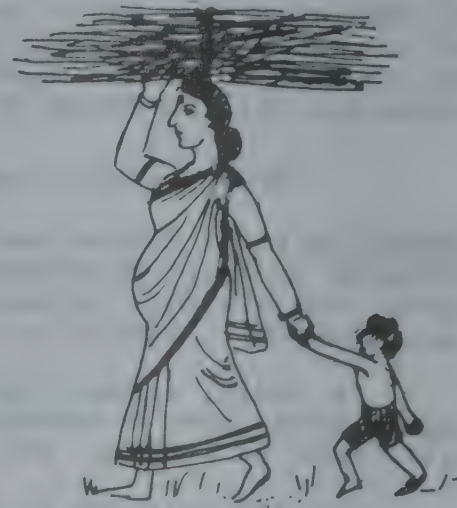


Fig. 4  
RICKETS - DUE TO LACK  
OF VITAMIN-D AND  
CALCIUM DEFICIENCY



EXTRA CALCIUM SALTS ARE REQUIRED BY  
LACTATING AND PREGNANT MOTHERS  
Fig. 5



## HAZARDS & ACCIDENTS PROTECTION TECHNOLOGIES

Women face many hazards in the kitchen, the home, the farm and the factory. The number of women injured, maimed or killed in various hazards- their cause and prevention need to be thoroughly studied and a remedy in each case needs to be sought.





## BURNS

Most of the burns can be prevented. Take special care with children :

- Do not let small babies go near a fire.
- Keep lamps and matchboxes out of reach.
- Turn handles of pans on the stove so that the children cannot reach them.
- It is important to keep a burn wound as clean as possible.
- Protect it from dirt, dust and flies.

### Minor Burns that do not form blisters (1st degree) :

To help ease the pain and lessen the damage caused by a minor burn, put the burned part in cold water at once. (Fig 70.1). No other treatment is needed. Take aspirin for pain.

### Burns that cause blisters (2nd degree) :

Do not burst blisters.

If the blisters are broken, wash gently with soap and boiled water that has been cooled. Sterilize a little vaseline by heating it until it boils and spread it on a piece of sterile gauze. (Fig 70.2). Then put the gauze on the burn.

If there is no vaseline, put some gentian violet, leave the burn uncovered.

If signs of infection appear- pus, bad smell, fever, or swollen lymph nodes - apply compresses of warm salt water (one teaspoon salt to one litre water) three times a day. Boil both the water and cloth before use. With great care, remove the dead skin and flesh. You can spread on a little antibiotic ointment such as neosporin. In severe cases, consider taking an antibiotic such as penicillin or ampicillin by mouth.

Deep Burns (3rd degree) that destroy the skin and expose raw or charred flesh are always serious, as are any burns that cover large areas of the body. Take the person to a health centre at once. In the meantime wrap the burned part with a very clean cloth or towel.

If it is impossible to get medical help, treat the burn as described above. If you do not have vaseline, put some gentian violet and leave the burn open, covering it only with loose cotton cloth or sheet to protect it from dust and flies. Keep the cloth very clean and change it each time it gets dirty with liquid or blood from the burn. Give penicillin.



Never put grease, fat, hides, coffee or herbs on a burn. Use the following remedies immediately if a person gets burnt :

- a) Squeeze the bark of a plantain tree (Fig 70.3) and apply it on the burn. This has a cooling effect.
- b) Strong black tea can also be applied to the burnt area.
- c) Crush tapioca leaves and apply on the burn (Fig 70.4).

## 70 BURNS

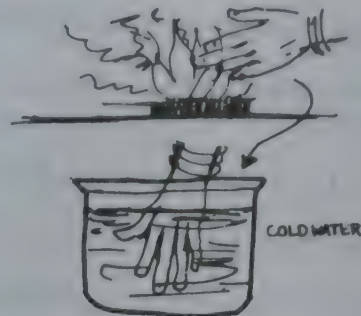


Fig. 1



Fig. 2

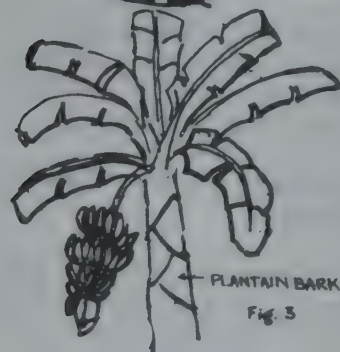


Fig. 3

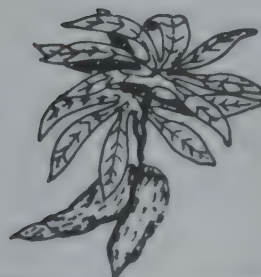


Fig. 4

SNAKE=BITE

All snakes are not poisonous, nor can they outrun man as commonly believed. There are only four common poisonous snakes in India:-

1. Common cobra (Hindi: Nag)
2. Common krait (Hindi: Bangarus)
3. Russel's viper (Hindi: Daboia)
4. Saw-scaled viper (Hindi: Bhoorsa)

Cobra is less than a foot long. It has a clear 'arrow head' design on the head. Both Russel's viper and Saw-scaled viper have a triangular head and a narrow, thin neck.

When a person has been bitten by a snake, try to find out if the snake was poisonous or not. Their bite marks are different as can be seen from the diagram. Fig.71.1 & Fig.71.2.

Symptoms of Poisonous Snake-bite:

(At the site of the snake bite: local signs)

These signs appear within 15 to 30 minutes of the bite:

- Pain - may be quite severe and may last for many days.
- Swelling - depends on the amount of poison that has entered the blood. In case of viper bites, pain and swelling at the site of the bite is more severe.
- bleeding from the bite - this is more common in the case of viper bite.
- Discolouration of skin around the area of the bite.
- Infection and gangrene may also develop.

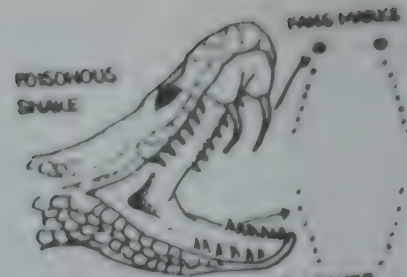
General symptoms: These develop from 15 minute to one hour after the bite.

Cobra and Krait bite: affect the nervous system:

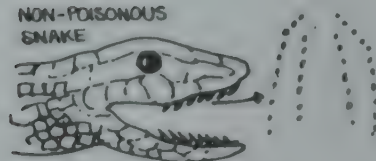
- Drowsiness
- Weakness of the muscles, especially the muscles around the eyes. The person may start seeing double (double vision) and may develop a squint.
- Paralysis of muscles
- Respiratory failure which may lead to death.



# 71 SNAKE BITE



BITE OF A POISONOUS SNAKE LEAVES  
MARKS OF THE TWO FANGS  
Fig. 1



BITE OF A NON-POISONOUS  
SNAKE LEAVES ONLY 2 ROWS  
OF TEETH MARKS BUT NO  
FANG MARKS  
Fig. 2

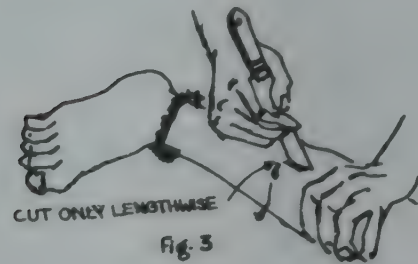


Fig. 3



SUCK AND BRITOUT THE POISON FOR  
ABOUT 15 MINUTES  
Fig. 4

Viper bite: affects the clotting of blood;

- headache,
- Nausea. vomiting
- Cough with blood stained phlegm
- bleeding under the skin
- signs of shock, if there is too much bleeding.

Treatment for Poisonous Snake-bite:

1. Stay quiet; do not move the part that has been bitten. The more it is moved, the more rapidly the poison will spread through the body. A person who has been bitten on the foot should not walk, not even one step if it can be avoided. Carry him on a stretcher.
2. Tie a cloth around the limb, just above the bite. Do not tie it very tight, and loosen it for a moment every half an hour.
3. With a very clean knife (sterilized in a flame) make a cut into each fang mark: about 1 cm long and 1/2 cm deep. (Fig.71.3).
4. Then suck (and spit out) the poison for a quarter of an hour. (Fig.71.4)

Note: If more than half an hour has passed since the bite, do not cut or suck the wound. By then it may do more harm than good.

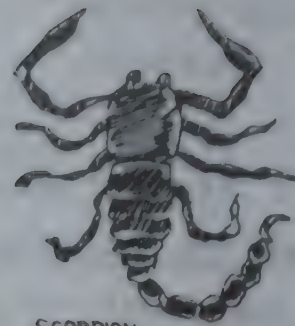
5. If a person develops any of the general symptoms described above, inject Antivenin, being careful to follow the instructions that come with the medicine. Inject 1/2 c.c. of Adrenaline under the skin to prevent the person from getting allergic shock. Antivenin is most effective if you inject it within 3 hours after the bite (for some snakes like cobra it must be given immediately).
6. If you can get ice, wrap pieces in thick cloth and pack these around the limb that was bitten.
7. Give tetanus toxoid injection to prevent tetanus.
8. If symptoms of infection develop, use penicillin.

Poisonous snake bite is dangerous. Send for medical help at once, but always do the things explained above at once.

Never drink alcohol after a snakebite. It makes things worse.



## 72 SCORPION STING

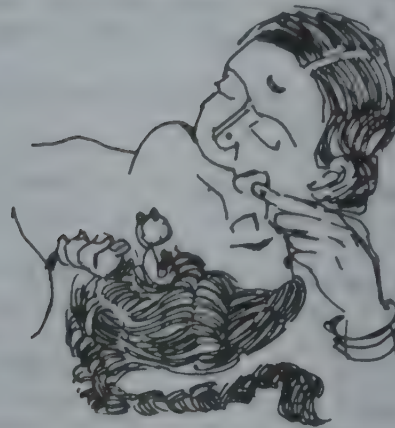


SCORPION

Fig. 1

MOUTH-TO-MOUTH BREATHING IF  
BREATHING HAS STOPPED

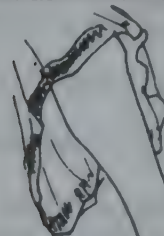
Fig. 2



A DROP OF LIME IN A PINCH OF  
POTASSIUM PERMANGNATE



Fig. 3



POUR THE  
MIXTURE ON THE  
EXACT SITE OF  
THE STING

### SCORPION STING

Some scorpions are far more poisonous than others Fig.72.1. For children under 5 years old, scorpion sting can be dangerous, especially if the sting is on the head.

#### What to do for Scorpion stings:

If it is for the first time in an adult, do the following:

- Give aspirin and if possible, put ice on the sting.
- Inject Novacaine (5 to 10 ml) around the sting. This helps reduce pain but may give only temporary relief.
- Antihistamine tablets can also be given.

If it stings for the second time in an adult or in children under five, do the following:

- Seek medical help, as early as possible.
- If breathing has stopped, do mouth-to-mouth breathing (Fig.72.2)
- If the person is in shock, treat the shock.
- If the child who was stung is very young, or has been stung on the main part of the body, or if the sting is for the second time= seek medical help fast.

For an effective home cure for the first scorpion sting in adults, do the following:

- Cut a piece of onion and rub it on the site of the sting. This helps in relieving pain.
- Grind a small pinch of potassium permanganate with equal amount of citric acid. (If you cannot get citric acid powder, you can use one drop of lime juice). Collect the powder into a paper and spread it over the exact site of the sting (Fig.72.3) Add a single drop of water. It will begin to bubble vigorously and will become very hot. This usually gives immediate total or partial relief.

#### WARNING:

Tender skin may get badly burnt or blistered; spread the powder only on the exact site of the sting. (Fig.72.3).



73



ARTIFICIAL FOOT

JAIPUR FOOT

Fig. 1

JAIPUR FOOT

A Jaipur orthopaedics surgeon, Professor P.K. Sethi, and his colleagues at the Sawai Man Singh Medical College and hospital, Jaipur, India, found in the early 1960s that the Western style artificial limbs were totally impractical for most Indian amputees, besides being expensive.

They were generally designed for people who sit on chairs and walk on level surfaces and they also need to be fitted with a shoe. Indians, however, often squat or sit cross-legged and villagers walk barefoot over stony, uneven ground and sometimes work all day in muddy fields. The Jaipur team decided to design a limb which is suited to the Indian life-style and, in rejecting the conventional western ideas, came up with something far more superior.

The Jaipur Foot (Limb) is made of aluminium, with no plastic or wooden sockets, and can be ready for use within 45 minutes, and lasts for two to five years.

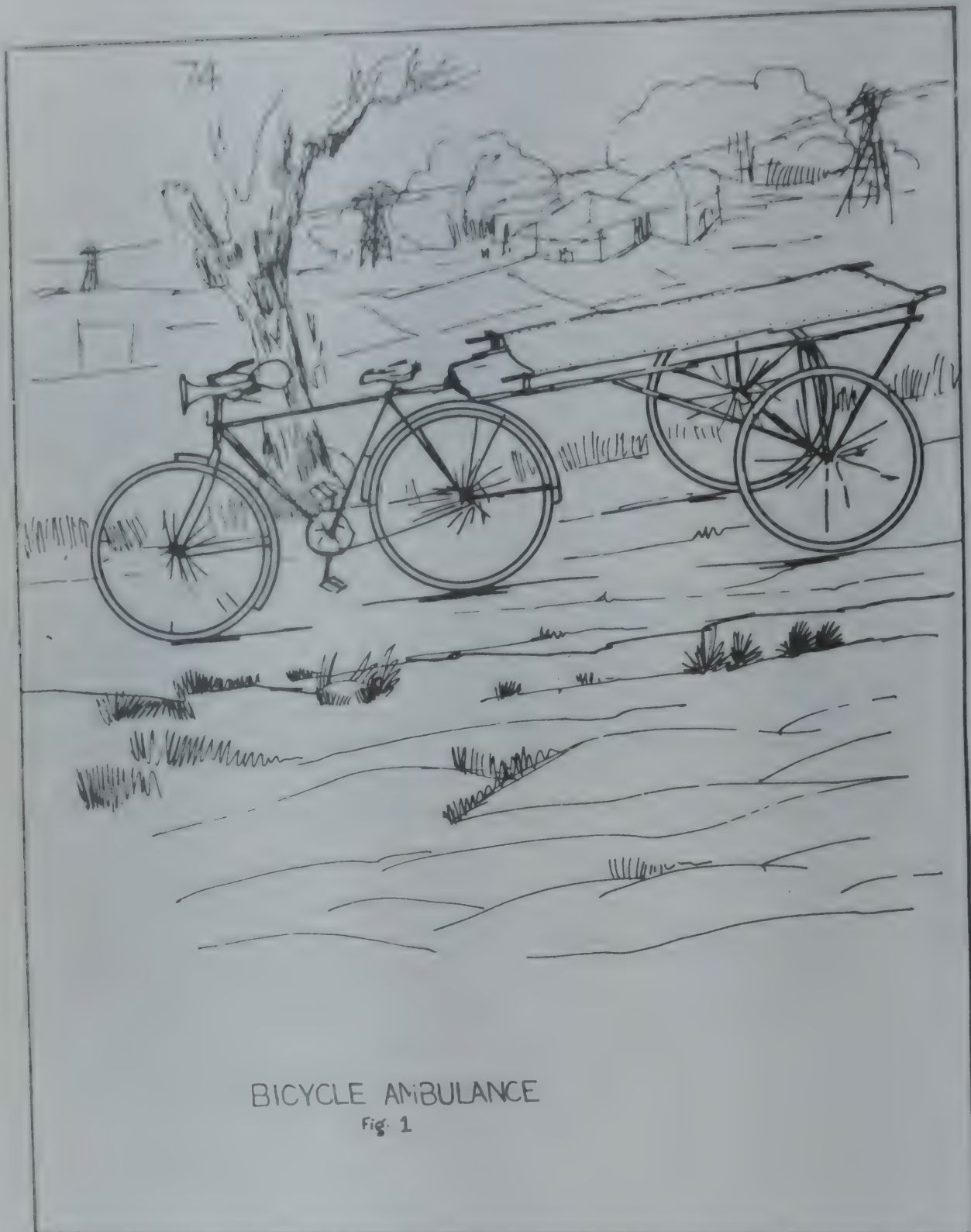
The 'Jaipur Foot', as it has become internationally known, is a waterproof and sturdy rubber foot-piece. It contains a virtually indestructible sponge rubber universal joint, enclosed in rayon cord (as used in tyres). Externally it has a layer of vulcanised rubber moulded in a die. The design allows the range of movement required for squatting or sitting cross-legged and walking on uneven ground. The foot-piece looks so realistic that it is difficult to distinguish it from a normal foot' (Fig.73.1).

Dr. Sethi was awarded the Raman Magsaysay award, for his unique design.

Price: Rs. 300

Source: Sawai Man Singh Medical College,  
Jaipur (Rajasthan),  
INDIA.





Tech.No.74:

### A BICYCLE AMBULANCE

#### Description:

You can make a simple, inexpensive bicycle ambulance for your village. It is not necessary to purchase a bicycle. You can use the one that belongs to someone who is helpful in your village.

#### Materials:

- Two thick wooden or bamboo poles 2 1/2 metres long.
- Strong canvas or other cloth 2 1/4 metre long and 90 cms wide.
- One sheet to cover the patient, a metal or heavy bamboo or wooden frame to hold the stretcher - 2 metre 35 cms long and 56 cms wide.
- Canvas strips 7 cm wide and at least 1 metre 80 cms long.
- A pair of bicycle wheels fitted into a metal frame-the village blacksmith can make this.

#### Construction:

- Fold the long ends of the cloth on both the sides and stitch it well, so that the bamboo or wooden poles can fit into them. Be sure to stitch very well with strong thread so that it does not open.
- In the frame which holds the stretcher, cut deep grooves so that the handles of the stretcher will fit properly, and will not fall off when the bicycle moves. You may also tie the handles to the frames as an added precaution. (Fig.74.1).
- Lift the injured person on to the stretcher.
- When the stretcher is secure on the frame, cover the person with a sheet. Tie the patient with broad canvas bands to the stretcher.
- Drive carefully, avoiding jolts and short turns.
- This type of ambulance is particularly useful if the health centre or hospital is very far and if the injured or sick person has to be taken immediately for medical help.



### TOXINS IN FOODS

Undesirable constituents in food pose health hazards of serious dimensions which are of great practical relevance to public health nutrition. These toxins could be naturally occurring, produced by fungal infestation, or contaminated due to accidental or intentional mixing with foods. Some of the major areas of research are:-

a) Aflatoxicosis from Groundnut: It is caused by a toxin, named aflatoxin. Owing to unsatisfactory post harvest storage conditions in our country, aflatoxin contamination of groundnut is common. The liver is strikingly affected by aflatoxin. Malnourished animals suffering from deficiencies of protein, vitamin and riboflavin were found to be more susceptible to aflatoxin. The higher percentage of aflatoxin was present in the milk of animals, fed with higher percentage of aflatoxin. There is one variety of groundnut from Junagadh which is resistant to toxin elaboration. This variety is agronomically superior and has more than an average yield in oil. This character of resistance to the elaboration of toxin was stable in different agroclimatic and soil conditions. Cultivation of such varieties has therefore been recommended.

b) Argemone Poisoning and Epidemic Dropsy: Outbreak of epidemic dropsy due to contamination of edible oils with *Argemone mexicana* have been occurring sporadically in several parts of India. The disease is characterised by gastrointestinal symptoms, oedema of face and limbs, erythema and in a few instances death due to cardiac arrest. Edible oil contains sanguinarine which is a toxic agent. Argemone oil, besides sanguinarine, may also be responsible for the toxic manifestation. A method has been developed for the detection of argemone in edible oils. This method detects contamination at a level of one ppm.

c) Mustard Oil contains Erucic Acid: Deleterious effects of this acid have been reported. Animals fed with mustard oil showed sarcoplasmic vacuolation of right and left ventricular myocardium. Some animals also exhibited a variable degree of myocardial fibrosis. The significance of this finding is to be examined particularly in those habitually consuming mustard oil.

Carcinogenic residues in edible oils could arise from subgrade solvents used in extraction process or due to deliberate or accidental contamination of mineral oils. A systematic study is in progress to examine the carcinogenic residues in edible oils processed by the solvent extraction process.

d) Lathyrus sativus Causing Lathyrism: 'Kesari Dal' is less expensive than other pulses; therefore, is commonly used. This has given scope for adulteration. The continuous use of this pulse causes paralysis of leg called lathyrism, due to the toxin. A method has been developed to remove toxin from it by soaking it in hot water for two hours. Water is removed and pulse is dried. This method was found to remove all the toxicity.

#### Source:

National Institute of Nutrition,  
Indian Council of Medical Research,  
Hyderabad - 500 007 (A.P.)





